

FINAL REPORT

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BENEFIT ANALYSIS OF SPC PANEL SP-3 PROJECT

**and**

EVALUATION OF SPC PANEL SP-3 MANAGEMENT AND ADMINISTRATION

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In behalf of  
SNAME Ship Production Committee Panel SP-3  
on  
Surface Preparation and Coatings

Under the  
National Shipbuilding Research Program

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## Report Documentation Page

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## PREFACE

The National Shipbuilding Research Program is sponsored by the Maritime Administration, United States Department of Transportation, and by the United States Navy toward improving productivity in shipbuilding. An important part of this Program is carried out by S NAME Ship Production Committee Panel SP-3 on Surface Preparation and Coatings. This Task was requested by the Chairman of that Panel (James R. Ruecker, NASSCO) in behalf of the Panel members.

The Task reported herein is a survey and analysis of ( 1 ) the benefit value that has accrued from the projects sponsored during the past 15 years by Panel SP-3, and (2) how the management and administration of Panel SP-3 itself - meetings, discussions, activities is seen by the using community. The purpose of this survey was (1) to determine the type of project most beneficial in the past, and therefore most likely to yield the largest benefit value in the future, and (2) to determine how the direction of Panel SP-3 itself may be improvd.

The Task was conducted by Rodney A. Robinson, Vice President of Robinson-Page-McDonough and Associates, Inc. Personal interviews were conducted with several representative members of the SP&C community to gain the necessary information. Conclusions and recommendations based on analysis of the findings are included in the report. The work, under NASSCO Purchase Order No. MU124548-D, began in July 1988 and was completed in July 1989.

## EXECUTIVE SUMMARY

This Task has investigated the benefits derived from the projects sponsored during the past 15 years by Ship Production Committee Panel SP-3 on Surface Preparation and Coatings ( SP&C) under the National Shipbuilding Research Program. It has found that those projects with the greatest practical application in the shipyard community have yielded the most value, such as training courses for blasters and painters. A close second has been those projects developing basic SP&C data, such as coating performance, not available elsewhere and needed to support the generation or modification of specifications and standards, and without which there is little hope of meaningful improvements in such requirements.

This Task has also assessed the opinion of the using community on the administration and management of Panel SP-3 itself. It has found that the current practices (under Panel Chairman James R. Ruecker, NASSCO) have been well received and should be continued. It has revealed the need to increase the number of attendees and participants from shipyards, in order to strengthen the shipyard focus on Panel efforts. It has also identified several important topics for near-future consideration by Panel members.

Panel SP-3 has made substantial contributions to the common body of knowledge in the SP&C area over the past 15 years. An open atmosphere of technical exchanges and professional activities has been effective in providing a forum and a focus for SP&C matters within the shipbuilding industry. Clearly, the advantages gained from dedicated participation in the NSRP in general, and Panel SP-3 in particular, is vital to the success of our industrial base, and deserves the fullest cooperation and support from everyone associated with it.

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## FINAL REPORT

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### BENEFIT ANALYSIS OF SPC PANEL SP-3 PROJECTS and

### EVALUATION OF SPC PANEL SP-3 MANAGEMENT AND ADMINISTRATION

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#### **BACKGROUND**

This project was initiated by the Chairman of SNAME Ship Production Committee (SPC) Panel SP-3 (James R. Ruecker, NASSCO) to (1) explore the benefits that may have resulted from Surface Preparation and Coatings (SP&C) projects carried out during the past 15 years, and (2) to evaluate how the management of Panel SP-3 itself is currently seen by the using community. The aim was (1) to focus on what type of project has been most helpful in the past, and may therefore be presumed to yield the most benefits in the future, and (2) how the activities associated with Panel SP-3 may be improved.

This project would consist of interviews with members of the SP&C community to gain information on these matters. The interviews would be on-site and face-to-face, to yield the most meaningful results. Analysis of findings would be published for principal consumption by SP-3 members toward their action on Panel operations and projects in the future.

#### **OVERVIEW**

Information on both aspects of this effort was gained through interviews with several members of the SP&C community. Included were members of the shipyard community (both commercial and Naval), paint suppliers, research and headquarters personnel, and long-time supporters of SP-3, for a total of 16 specific inputs.

It was originally intended to include several Naval Shipyard Paint Superintendents as interviewees, but it quickly became clear that this entire community has had NO involvement with the activities of Panel SP-3 in particular, and with the NSRP in general, and would therefore be unable to offer any meaningful input.

This revelation prompted a special presentation to this group (by the author, at a gathering they were having for other reasons) on the subject of the NSRP and SP-3. The presentation covered the NSRP charter and purpose, the SNAME SPC Panel structure, participating activities, project prosecution, typical subjects treated and activities conducted, and specifically those participants in and accomplishments of Panel SP-3 over the past 15 years. During the presentation, this group, which included the paint representative from the Naval Repair Facility at Guam, acknowledged that they had seen NONE of the project reports published by SP-3 over the years, and had no involvement with, or even exposure to, SP-3 or NSRP matters. As a followup, the author recommended to the Chairman of SP-3 that each of the individuals in this group be added to the mailing list for SP-3 material, and suggested that a special mailing be made to them of all SP-3 published reports as may be available today. In addition, they should each" receive a copy of the NSRP Bibliography of Publications, published by the University of Michigan.

The fact that this large segment of the SP&C community had no involvement with SP-3 matters would bias the results if their 9 inputs were to be factored into the survey. It was decided, therefore, to treat their situation separately. They are not a part of the 16 inputs to this survey.

Several questions were designed to explore both aspects of this survey. The worksheets for gathering information on the benefits of individual projects are contained in Appendix A. Those questions associated with Panel SP-3 direction are contained in Appendix B.

The period of interviews began in January and ended in May, 1989.

A detailed discussion of the findings is presented below. Those associated with the benefit analysis of Panel projects begin on page 4. Those associated with Panel management begin on page 35.

Conclusions reached from the findings of this Task are on page 47. The recommendations drawn from these conclusions are on page 48.

SPECIAL NOTE: Two NSRP projects, each outside the realm of Panel SP-3, were encountered during this survey, and were found to be providing considerable benefit to the shipyard community. Since this Task is concerned with reporting the beneficial value of NSRP projects, it is perhaps appropriate to mention them here.

The first is a current project under Panel SP-1 (Task 1-85-3) which is studying the question of smoke extraction at the source vs. ventilation of the entire area. This is a practical environmental concern with those processes involving the generation of smoke (or noxious fumes), particularly in confined spaces. Here is a research project that is providing what the using shipyard community has asked for and needs, with practical application right around the corner.

The second is a project under Panel SP-8 (Task EC-12, .1982) which studied the generation and application of scheduling standards for planning, scheduling, and capacity determinations in a pipe fabrication shop. The benefits resulting from this study have been large, and continue to accrue as the host shipyard expands the practical application of this technique to other shops and trade areas. Here, again, the research effort is treating a basic and practical need existing throughout the shipbuilding industry.

These two projects demonstrate the benefits possible from well-conceived and supported research efforts, and support the case for tasks having practical application potential in the shipyard community.

## BENEFIT ANALYSIS OF PROJECTS SPONSORED BY SPC PANEL SP-3

This section contains information on all of the projects investigated, including a description of each project, the pertinent information surrounding it, and an analysis of the benefit value gained from it to date. The NSRP number is that assigned to each project report in the NSRP Bibliography of Publications, published (now annually) by the University of Michigan for the National Shipbuilding Research Program. The analysis portion has been drawn from the comments offered by those interviewed, and is intended to provide a general indication of how the project has been received by the industry. It also indirectly provides the feelings of those interviewed on whether that particular type of effort should be sponsored by SP-3 in the future, since those projects with the higher benefit value might better receive the more favorable consideration. Appendix A was the worksheet used during the interviews.

The display in the Table below is intended to provide a rapid visual idea of the relative benefit value that has been gained from the projects that were investigated. While the ratings assigned are surely subjective, they represent the general opinions of those interviewed, which range from shipyard people, to headquarters and laboratory personnel, to paint suppliers, and to those in businesses related to shipbuilding and ship repair. As such, these opinions reflect the overall industry attitude surrounding these projects, which should be of interest and use to SP-3 panel members in considering the sponsorship of future projects.

The number of '\*'s against each project indicates the amount of benefit gained from it to date. The more '\*'s, the larger the benefit value gained.

NSRP NUMBER	BENEFIT VALUE	NSRP NUMBER	BENEFIT VALUE	NSRP NUMBER	BENEFIT VALUE
0032	****	0130	*****	0194	***
0033	**	0132	*	0204	**
0034	**	0134	**	0205	****
0045	****	0155	****	0207	**
0064	*****	0156	*****	0217	***
0091	*****	0158	***	0218	**
0092	*****	0162	**	0227	*****
0097	*****	0171	***	0228	*****
0105	****	0176	****	0229	***
0114	***	0177	***	0246	***
0119	*	0187	*	0248	***
0127	**	0188	*****	0272	****
0129	**	0191	****	0275	*****

## **-DETAILED DISCUSSION OF INDIVIDUAL PROJECTS**

This section addresses each of the individual projects in the chronological order in which they were carried out. Note: Appendix C is an abbreviated listing of these same projects (Number/Title/Author/Date/Cost) arranged according to the benefit value (number of '\*'s) assigned to each project, highest to lowest. Appendix C is included as an aid to understanding which types of projects were found to be of most (and least) interest and value to the using community, based on the user comments received during this survey.

NSRP 0032

**TITLE :** IMPROVED FABRICATION PRIMER FOR PROTECTION OF STEEL

**AUTHOR:** General Dynamics/Quincincyy

**DATE:** 1973

**COST:** (Not available)

**ABSTRACT:** : The objective of this report was to make available to the shipbuilding industry an acceptable pre-fabrication primer to protect steel plate after automtic abrasive blasting and before further use. Questionnaires distributed to U. S. shipbuilders determined industry needs, and a testing specification based on this information was developed. Included were: primer evaluation, 6 and 12 months weathering of primed steel in semi-tropical climates, top coat compatibility testing in a hydrodynamic tank at a water flow of 18 knots, impact resistance and flexibility of primers, drying time, welding tests, and welding fume analysis. (271 p. )

**BENEFIT ANALYSIS:** MIXED VALUE. Information in the rport Was recognized as dated (16 years old) but still of value as a reference source. The project was established to stimulate interest in this general subject. The report is voluminous. There were comments from those interviewed that shop primers are needed, that there should be uniformity among the types of shop primers available, that the top coat must be compatible with the shop primer, that safety and weldability are involved in the development of a shop primer and that Navy acceptance of a shop primer is necessary to allow its use. This project was the forerunner of Project 3-84-1 STANDARD CERTIFICATION AND TESTING OF WELD THROUGH PRIMERS currently being carried out at Pennsylvania Shipbuilding. Overall, 62% cf those interviewed either had no interest in this subject, or had studied the reported information with no application planned. Nevertheless, it appears that this project was appropriate at the time (1973) and has generated sufficient benefit as to justify its exstence.

NSRP 0033

**TITLE:** PREFAILEURE EVALUATION TECNIQUES FOR COATING SYSTEMS

**AUTHOR:** Battelle-Columbus Laboratories, for General Dynamice/Quincy

**DATE :** 1974 **COST:** (Not available)

**ABSTRACT :** The number of tests available to control quaqy of product, surface preparation, application and cure are too numerous to use in their entirety in shipyard painting. Further, there are today very few tests which can determine the probability of failure of a coating system with any degree of reliability after application. The success of a coating system is dependent on many things, from surface condition to weather at the of application. The only assurance of the quality of a coating system comes from monitoring and controlling the surface preparation, paint quality and application. A few post application tests can be made to obtain limited assurance that the coating system will perform satisfactorily. The probable minimum practical tests and controls are: establish requirements based on standards such as the Steel Structures Painting Council, the Swedish Surface Preparation Standards, or the Society of Naval Architects and Marine Engineers Bulletin 4-9, Abrasive Blasting Guide for cleanliness and profile; establish specifications (or obtain them from vendor); and make sufficient tests to insure that the product is within specifications. (243 p.)

**BENEFIT ANALYSIS:** LOW VALUE. 81% of those interviewed had no interest in this subject, or had studied the information in the report with no application planned. Several recognized that the reported information was stale, but saw it as a useful bibliography. The shipyarders generally noted that they do not prescribe coating systems, but rather respond to whatever is specified by the customer. They therefore have little interest in the contents of this report.

NSRP 0034

**TITLE :** AUTOMATIC PAINTING OF STRUCTURAL STEEL SHAPES

**AUTHOR:** General Dynamics/Quincy

**DATE:** 1974 **COST:** (Not available)

**ABSTRACT :** Because of the large variety of sizes and configurations of structural shapes used in U.S. shipbuilding, painting equipment manufacturers have been limited in the development of an automatic paint facility for the painting of structural steel shapes. Other parameters which had to be considered in developing an automated paint facility were all the various coatings which are used in the U.S. and the necessity of controlling the coating thickness within fine tolerances, particularly for weld-through primers, in order to be compatible with subsequent welding processes. With the help of paint equipment manufacturers, prototype equipment was developed to provide a reliable automatic paint facility capable of coating all shapes in U.S. shipbuilding. The prototype has the capability to handle special or otherwise unusual shapes with minor modifications. (36 p.)

**BENEFIT ANALYSIS:** LOW VALUE. The information in this report was being applied by only one of those interviewed, and was considered useful as a reference by two other interviewees. 69% either had no knowledge or interest in it, or had studied the information with no application planned.

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NSRP 0045

**TITLE:** DEVELOPMENT OF **NON-POLLUTING** SOLVENT-FREE LIQUID RESIN COATING SYSTEMS FOR SHIPS

**AUTHOR:** Battel-Columbus Laboratories, for General Dynamics/Quincy

**DATE :** 1975 **COST:** (Not available)

**ABSTRACT :** The objective of this research was to develop liquid, solvent-free coating systems and practical methods for their application in the shipyards. Successful attainment of this objective would result in lower cost due to elimination of solvents, faster application and fewer coats, ecological advantages resulting from elimination of solvents, and improved safety since elimination of solvents will decrease fire and toxicity hazards, particularly in

confined areas such as ship holds and tanks. (39 p.)

BENEFIT ANALYSIS S: MIXED VALUE. Those interviewed were clearly divided on the value of this project. 75% either had no interest in the subject, or had read the information in the report with no application planned. Comments ranged from "never developed into anything worthwhile" and "of no interest to the shipyard", all the way to "great interest in this one" and "forerunner of VOC compliant materials". In fact, this project has contributed to the body of information on water-based paints, and has led to a finding by NSRDC for specification F-25-A materials.

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**NSRP 0064**

**TITLE :** CATALOG OF EXISTING SMALL TOOLS FOR SURFACE PREPARATION  
SUPPORT FOR BLASTERS AND PAINTERS

**AUTHOR:** Avondale Shipyards, Inc.

**DATE :** May 1977 **COST:** (Not available)

**ABSTRACT:** This report defines the principles required for efficient blasting and painting. Specialized cleaning methods from power tool cleaning to closed cycle blasting are discussed, equipment and facilities are described, and cost reduction procedures are defined. (89 p.)

**BENEFIT ANALYSIS:** HIGH VALUE. Surface preparation techniques under Panel SP-11 was a spin-off from this project. The information in the report has been found useful in training painters and blasters, and also welders. 50% of those interviewed are either currently applying the information in the report, or are considering application of it in the near future. A follow-on project is underway to bring this area up to date.

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NSRP 0091

**TITLE:** PRACTICAL SHIPBUILDING STANDARDS FOR SURFACE PREPARATION  
AND COATINGS

**AUTHOR:** Offshore Power Systems, for Avondale Shipyards, Inc.

**DATE :** 1979 **COST:** (Not available)

ABSTRACT: This effort developed proposed "Shipbuilding Standard for Surface Preparation and Coating", and a "Standard Paint and Coating Product Data Sheet". Also, it identified the need for a preconstruction conference among the shipyard production and technical sections, the owner representatives, and the coating supplier. (52 p.)

**BENEFIT ANALYSIS: HIGH VALUE** This project has led to the development of ASTM Standard 718, and to two other standards. It has contributed to the area of receipt inspection of coating materials and coating inspection procedures for shipyard application. It led to the formation of the Paint/Coating Data Sheet currently in use. Although this information is now 9 years old, it is clear that this project has proven its worth, even though only 32% of those interviewed could cite actual application of the information produced.

NSRP 0092

**TITLE :** MARINE COATING PERFORMANCE FOR DIFFERENT SHIP AREAS (VOIS I& II)

**AUTHOR :** Offshore Power Systems, for Avondale Shipyards, Inc.

DATE : 1979 COST: (Not available)

**ABSTRACT :** A computer program was developed to compare the effectiveness of the different generic coatings in different ship areas. The trends indicated by the program were supported by prefailure analysis test results.  
(Vol. I 70 p. Vol. II 180 p.)

**BENEFIT ANALYSIS: HIGH VALUE.** Although 63% of those interviewed saw this project as of no application value to them, and although it "may have been ahead of its time in U. S. shipbuilding", in fact this project has led to the development of 4 standards and to the current Standard Data Sheet for collecting information on the performance of coatings. The Navy is developing a data

collection plan of their own, as a result of the information generated by this project.

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#### NSRP 0097

**TITLE :** TRAINING COURSES FOR BLASTERS AND PAINTERS AND STUDENT HANDBOOK  
(2 VOLs)

**AUTHOR:** Institute of Applied Technology, for Avondale Shipyards, Inc.

**DATE :** 1979; Revised 1984      **COST:** \$60,000.

**ABSTRACT :** Thirty-six shipyards participated in the instructor training program. Vol I 108 p., Vol II 250 p.)

**BENEFIT ANALYSIS:** HIGH VALUE. This project received the highest praise from those interviewed. It is the first training effort to be sponsored within the National Shipbuilding Research Program, and it has been well received. One shipyard acknowledged that this training program had saved them much money, because they would have had to develop their own training separately if this training program had not been available to them. 56% of those interviewed had applied the information provided by this project. The Naval Shipyards, however, apparently have not availed themselves of this information source, even though NavSea has presented it to them and encouraged them to use it. There were 9 or 10 papers that followed this report, and at one point (at least) the report was "out of print". This is a favorable commentary on the project.

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#### NSRP 0105

**TITLE :** CLEANING OF STEEL ASSEMBLIES AND SHIPBOARD TOUCH-UP USING CITRIC ACID

**AUTHOR:** Offshore Power Systems, for Avondale Shipyards, Inc.

**DATE :** May 1980      **COST:** (Not available)

**ABSTRACT :** This program confirmed the compatibility of citric acid cleaned surfaces with the present state of the art marine coatings, optimized the cleaning solution and procedure, and confirmed the feasibility of a Phase II

implementation study. (50 p.)

**BENEFIT ANALYSIS: MIXED VALUE.** Although 56% of those interviewed had no application benefit to report on this project, others noted that there was "lots of citric acid cleaning going on" and that there was at least limited use for citric acid in cleaning such areas as bilges. The Navy has implemented citric acid cleaning, but in parallel with this project and not as a result of it. With 32% of those interviewed citing some application of the information in this report, the benefits resulting from the study would appear to justify it. It is interesting to note, however, that the nuclear power generation area has found this technique useful in cleaning concrete, where they say "it works nicely".

NSRP 0114

**TITLE :** SHIPYARD-MARKING METHODS

**AUTHOR :** Bethlehem Steel Corp (Sparrows Point) for Avondale Shipyards, Inc.

DATE : September 1980 COST: (Not available)

**ABSTRACT :** This report identified a marking material which would meet the necessary marine top coat requirements of durability and overall ability.  
(63 p.)

**BENEFIT ANALYSIS: LOW VALUE.** 56% of those interviewed saw this project as of no application value to them. One pointed out that the dispenser was the real problem, and not the marking material itself. Only 19% had used the information reported.

NSRP 0119

**TITLE :** COPPER-NICKEL HULL SHEATHING STUDY

**AUTHOR :** Dr. Leslie W. Sandor, for Sun Ship, Inc.

**DATE :** December 1980                    **COST:** (Not available)

**ABSTRACT:** Fuel consumption of ships is related to hull roughness. The increasing high cost of fuel is the driving force behind the efforts that are expended in looking for methods which would reduce hull roughness and would maintain a smooth hull surface profile during the design life of the ship. One such method involves the use of copper-nickel. This study examined a number of methodologies for applying Cu/Ni in sheet form. The welding of Cu/Ni clad steel was also evaluated in a shipyard environment. The cost differential between Cu/Ni sheathed and conventional painted hulls was determined for a large container ship. (95 p.)

**BENEFIT ANALYSIS:** LOW VALUE. This project, reportedly promoted by the oyster lobby in Washington, D.C., because of the environmentally clean nature of a hull sheathed with copper-nickel, attempts to quantify the application of such sheathing in a shipyard context. The study is lofty, and appears to have been of no practical shipyard value. It may have served some particular interest in the research laboratory area, but no instance of actual benefit was uncovered during interviews with 16 members of the shipbuilding industry. 81% of those interviewed saw this project as either of no interest to them whatever, or as having no application potential in their shipyard.

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NSRP 0127

**TITLE :** DETERMINATION OF VOLUME SOLIDS OF PAINTS AND COSTINGS BY ACCURATE DRY FILM THICKNESS MEASUREMENTS

**AUTHOR:** Georgia Institute of Technology, for Avondale Shipyards, Inc.

**DATE :** March 1981                    **COST:** (Not available)

**ABSTRACT :** A new method to determine the volume solids of paints and coatings based on the measurement of dried film thickness over a known area was studied. It was compared to the American Society for Testing Materials Method D, Volume 2697-73, "Nonvolatile Matter in Clear and Pigmented Coatings". This

method determines the volume of the dry film by application of the Archimedes buoyancy effect. In addition, the project was structured to extend the ASTM method to coatings systems used in the marine industry. (38 p.)

**BENEFIT ANALYSIS: LOW VALUE.** Returns were mixed on this study. 50% of those interviewed saw the project as having no value to them. Comments ranged from "bomb-out", to "reference only", to "have used", to "have used to defend positions", to "did not develop a good method". Clearly, this project has not enjoyed widespread acceptance within the industry.

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NSRP 0129

**TITLE :** THE FEASIBILITY OF CALCITE DEPOSITION IN BALLAST TANKS AS A  
METHOD OF CORROSION C O N T R O L

**AUTHOR:** Ocean City Research Corporation, for Avondale Shipyards, Inc.

**DATE :** August 1981 **COST:** (Not available)

**ABSTRACT :** This program evaluated the parameters required for the deposition of thick calcite coatings on a steel substrate from low concentrations of colloidal calcium carbonate. This coating, in conjunction with anodes, would provide an economical means of corrosion protection in ballast tanks. Heavy coating deposition was obtained but solution agitation or flow was required. Phase II of the program will attempt to provide a practical method of initiation compatible with the complex configuration of ballast tanks. (30 p.)

**BENEFIT ANALYSIS: LOW VALUE.** This project, which may have been targeted more toward ship owners than the shipyard community, appears to have no instances of practical application to its credit. Although several commentors noted that the study was well done, helped to illuminate the area of cathodic protection, and was a good reference work, calcite deposition is apparently not used in ballast tanks anywhere. Only one of those interviewed could report that this project was of any real value to him. The follow-on phase of this project will not be done, because "it needs lots of money to make it go".

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NSRP 0130

**TITLE:** PROCEDURAL HANDBOOK.  
SURFACE PREPARATION AND COATING FOR TANKS AND CLOSED AREAS

**AUTHOR:** Complete Abrasive Blasting Systems, Inc. , for Avondale shipyards , Inc .

**DATE:** September 1981 **COST:** \$24,000.

**ABSTRACT:** The handbook provides the necessary information for planners to effectively, efficiently, and safely plan painting operations in confined areas. The information contained within this handbook includes: identification of the requirements and related problems associated with surface preparation and painting of tanks and enclosed areas; identification of personal exposure limits; identification of monitoring equipment for measurement of fume and dust concentration and ventilation rates; identification of maximum allowable concentrations and ventilation requirements for abrasive blasting and coatings application; and identification of suitable ventilation and abrasive blast equipment for shipyard operations. (113 p.)

**BENEFIT ANALYSIS: HIGH VALUE.** This project report has become a useful reference for the shipyard industry. One of those interviewed said "this would be the last reference book to leave my bookshelf". The report has become quite Popular, With SSPC still selling copies of it. Usage has extended to steel tanks (not marine or shipboard), which illustrates its value as a reliable and practical research-prcduced reference. 44% of those interviewed cited actual application of this information in their area.

NSRP 0132

**TITLE : EVALUATION OF NEAR SOLVENTLESS COATINGS FOR MARINE USE**

**AUTHOR:** Springborn Laboratories, Inc., for Avondale Shipyards, Inc.

DATE : October 1981 COST: \$27,500.

ABSTRACT : This program compared available near solvent free coatings with available 'state of the art' marine coatings. The coatings were exposed to testing conditions representative of the different ship areas. Many of the coatings performed as well as conventional system but usage in certain ship

areas would be limited because of application requirements and build characteristics. (41 p.)

**BENEFIT ANALYSIS:** LOW VALUE. This project "was a look at VOC before it became Popular", and "was a breakthrough at the time". However, 80% of those interviewed saw it as having no value to them. The most charitable comment received was that the information in the report was "nice to know, only".

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**NSRP 0134**

**TITLE :** EVALUATION OF WATER BORNE COATINGS FOR MARINE USE

**AUTHOR:** Georgia Institute of Technology, for Avondale Shipyards, Inc.

**DATE :** November 1981 **COST:** \$33,700.

**ABSTRACT :** This report compares available water borne coatings to conventional marine coating systems. A limited number of these coatings compared sufficiently well to warrant application testing. (68 p.)

**BENEFIT ANALYSIS:** LOW VALUE. This project report seems to be of less interest today than when it was first published. The information may have been dated even when it came out initially, although the report appears to be generally accepted today as a good reference. Several shipyard people commented that the specification determines the coating, and that they play no part in that determination. It follows that they (69% of those interviewed) have little interest in this sort of information. No instance of application was forthcoming from the laboratory or headquarters people interviewed.

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NSRP 0155

TITLE : SURVEY OF EXISTING AND PROMISING NEW METHODS OF SURFACE  
PREPARATION

AUTHOR: Steel Structures Painting Council, for Avondale Shipyards, Inc.

DATE : April 1982 COST: (Not available)

ABSTRACT : This report surveys and evaluates surface preparation and coating methods with special emphasis on new and conceptual ideas which might be developed for effective use in shipbuilding. (99 p.)

BENEFIT ANALYSIS: MIXED VALUE. This project has produced a useful reference that has found its way to the Automation Committee at NavSea. Although of no reported practical use to the shipyard community (according to 63% of those interviewed), it "got the word out on new systems available" to the industry, was "nice to know", and "interesting reading". Only one commentor said that the project was "not needed".

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NSRP 0156

TITLE : SURFACE TEXTURE(PROFILE) MEASUREMENT

AUTHOR : Offshore Power Systems/Westinghouse, for Avondale Shipyards, Inc.

DATE : May 1982 COST: (Not available)

ABSTRACT : Many techniques exist for measuring surface texture [profile]. Each gives a different average measurement with some overlap within the range of measurements. The most important observation concerning these measurements was that none is precise, due to the random nature of the surface prepared for painting. To preclude these problems, future paint specifications, if referencing required profile heights, should specify the measurement techniques with a wide range of acceptable values. (73 p.)

BENEFIT ANALYSIS: HIGH VALUE. This report is a textbook that is still being sold by SSPC. It has led to an article in the Journal of Protective Linings. Generally considered as a good reference, the Navy especially is a frequent and heavy user of the information contained in the report. Commercial shipyard people also use the information in dealing with the Navy on profiles.

Although 56% of those interview saw this project of no value to them, 32% saw it otherwise, with 19% reporting heavy application usage. One commentor said "I read it yesterday". Another said "it is timely and good". It appears that this project has clearly justified its value to the industry.

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NSRP 0158

TITLE: CATHODIC PROTECTION/PARTIAL COATINGS VERSUS COMPLETE COATINGS  
IN TANKS

AUTHOR: Offshore Power Systems, for Avondale shipyards, Inc.

DATE : May 1982 COST: \$50,000.

ABSTRACT : The O-23-1 Panel of SNAME selected a research and development project to investigate alternative, cost effective corrosion control systems. Four approaches were selected for mock-up ballast tanks testing and 20 year life cycle cost analysis: completely coated tanks with high performance coatings; partially coated tanks with cathodic protection; soft coatings with cathodic protection; and preconstruction primer with cathodic protection. (71 p.)

BENEFIT ANALYSIS: LOW VALUE. This project has not yet produced any practical applications, but is generating information of substantial research value to the industry. One commentor said "owners and operators should read and understand" this material. Another said "this is the pet project of SP-3" and "it has been responsible for 2 articles in the Journal". The project is still going on, and continues to produce research information that is not available elsewhere. The low benefit rating assigned to this project simply reflects the absence of a practical application, a situation that could change dramatically as the specification producers and laboratory people become more aware of the information being generated by this project and its continuation.

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NSRP 0162

**TITLE: A DESCRIPTIVE OVERVIEW OF JAPANESE SKWNILOING SURFACE PREPARATION AND COATING METHODS**

AUTHOR: Avondale Shipyards, Inc.

DATE: September 1982 COST : (Not available )

**ABSTRACT:** This report gives a discussion of the methods used in Japanese shipyards regarding surface preparation and coatings, planning, application, and materials. This comparative analysis is based on a tour of four Japanese shipyards and two major surface preparation and coating subcontractors. (76 p.)

BENEFIT ANALYSIS: LOW VALUE. 60% of those interviewed saw this project as holding no value for them. Essentially a trip report that may have contradicted some generally held perceptions of what the Japanese are really doing (as compared to what they say they are doing), the ideas espoused here appear as not universally embraced by the U. S. shipbuilding industry. Comments suggest that the information contained in the report may be of some use to Panel SP-2 in promoting on-block/on-unit technology, but is generally of no practical production value to the shipyard community. The larger commercial shipyards who already have the Japanese technology in place saw this project as supportive of their existing programs, but the rest of those interviewed saw the report as "informative, but of not much practical use". Only one commentator noted that the information was "useful in the area of weld-through primer"; otherwise, no specific applications were cited during the interviews.

NSRP 0171

THE EFFECTS OF EDGE PREPARATION STANDARD PHASE T

AUTHOR : Dr. Leslie W. Sandor, for Avondale Shipyards, Inc.

DATE : May 1983 COST: \$50,000.

ABSTRACT: The result of a literature search on available standards on edge preparation and surface defect repair is reported. Studies on the effects of edge preparation on coating life are documented, highlighting the results of a Russian study. (92 p.)

BENEFIT ANALYSIS: LOW VALUE. This report appears to be the first one published on this subject. It is a reference work, generally considered as "good", "educational", "filed away for future use". An article is being prepared for the Journal of Ship Production on this subject, reportedly in several languages, using the findings of this project. Although 65% of those interviewed saw this report as having no value to them, it appears that this type of research is appropriate for sponsorship by SP-3, and may support important practical changes in specifications and/or procedures in the future.

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NSRP 0176

TITLE: SURFACE PREPARATION: A COMPARATIVE ANALYSIS OF EXISTING STANDARDS  
AND A PROPOSED MARINE STANDARD

AUTHOR: Institute of Applied Technology, for Avondale Shipyards, Inc.

DATE : August 1983 COST: (Not available)

ABSTRACT: The report documents a comparative analysis of existing surface preparation standards and proposes a standard for the marine industry. (86p.)

BENEFIT ANALYSIS: MIXED VALUE. This project was considered useless by 72% of those interviewed, but in fact has been responsible for an abrasive blast media standard as a follow-on result of this research. One commentator said "this woke up SSPC". Another said that this project "has affected the whole industry". Such mixed reviews are responsible for the mixed benefit analysis, but generally it appears that the project was indeed worthwhile.

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NSRP 0177

TITLE : ZONE PAINTING MEIHOD

AUTHOR : IHI, for Avondale Shipyards, Inc.

DATE : August 1983 COST: \$100,000.

building productivity. The planning and organization required to achieve this are discussed. (61 p.)

BENEFIT ANALYSIS: MIXED VALUE. Returns were split on this project. 33% saw it as useless (those with no involvement in Japanese technology transfer), whereas 40% saw it as valuable (those with on-going programs for Japanese technology transfer). Generally regarded as a "good study", it has gained a mixed rating here, even though only one specific instance of application was revealed during the interviews.

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NSRP 0187

TITLE: AN INVESTIGATION OF SIRLEWAYS TO ENHANCE TITLE DEPCSITIONOF  
CALCITE-TYPE COATINGS

AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc.

DATE : January 1984 COST: \$55,000.

ABSTRACT: The shipbuilding industry has directed much effort toward ways of limiting escalating coating costs. Of special concern, with respect to increasing coating costs, are segregated seawater ballast tanks. The use of calcite-type coating represents a possible alternative approach for controlling corrosion in the segregated tanks with a substantial savings in cost. As a result, Ocean City Research Corporation undertook a follow-up laboratory study which continual investigating the feasibility of applying calcite-type coatings to segregated ballast tanks. (57 p.)

BENEFIT ANALYSIS: LOW VALUE. This project was seen as having no interest or practical value to 93% of those interviewed. Although considered "feasible", the area would need a "larger scale operation, and lots of money" to succeed.

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NSRP 0188

TITLE : MINERAL SLAG ABRASIVE SURVEY AND SPECIFICATION

AUTHOR : Ocean City Research Corporation, for Avondale Shipyards, Inc.

DATE: April 1984 COST: (Not available)

ABSTRACT: Because of potential silicosis problems, the U.S. shipbuilding industry has largely abandoned the use of open-air sand blasting. The predominate abrasives now being used for open-air blasting are mineral slags having a low free silica content. Concerns about their continued availability as well as batch-to-batch variations in quality prompted the subject program. Hence, a study was performed to catalog sources of mineral slag abrasives for U.S. shipyards, and to develop a tentative material specification for mineral slag abrasives consistent with the requirements of U.S. shipyards. (52 p.)

BENEFIT ANALYSIS: MIXED VALUE. The information developed by this project has been used in the development of an abrasive blast media specification and a Navy MIL Spec. Although several of those interviewed stated that their shipyard 'had no choice in the matter' due to cost considerations, most agreed that the project had produced information of "definite interest and use". One commentor stated that he would be "recommending facilities as a result of this study". With only 25% of those interviewed citing practical application value, however, the assigned benefit rating of mixed appears appropriate.

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NSRP 0191

TITLE : EVALUATION OF RUST COMPATIBLE PRIMERS FOR MARINE APPLICATIONS

AUTHOR : Rensselaer Polytechnic Institute, for Avondale Shipyards.

DATE : May 1984 COST: (Not available)

ABSTRACT : The principle objective of the program was to determine the state-of-the-art of primers and/or coating systems which were designed to be applied directly to a rusted surface, and to determine through laboratory evaluations if any of the materials performed sufficiently well to be used in marine applications. (56 p.)

BENEFIT ANALYSIS: MIXED VALUE. This project was a first cut at coating less-than-perfect surfaces. This study brings attention to a new way of looking at this problem. Coatings are now available on the market for these surfaces. Although 73% of those interviewed saw the project as holding no interest or value to them, and owners and customers appear somewhat reluctant to agree with the findings, there seems to be a potential for cost savings embodied in these findings that could become important in the parsimonious future.

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NSRP 0194

TITLE: SHIPYARD DESIGN AND PLANNING FOR ZONE ORIENTED PAINTING SYSTEM

AUTHOR: IHI Marine Technology, for Avondale Shipyards, Inc.

DATE : July 1984 COST: \$100,000.

ABSTRACT : This paper describes the Zone Painting Method, a new concept in ship construction which is based on the Product Work Breakdown Structure. The essence of the Zone Painting Method is proper planning and scheduling, in coordination with hull construction and outfitting. Design and planning structures, as related to zone painting, are presented. Departmental responsibilities for those segments of the shipyard organization which impacts painting are detailed. The paper then proceeds to delineate the planning process according to the three phases of contract planning, system planning and zone planning. These phases examine the painting process in ever-increasing detail. (64 p.)

BENEFIT ANALYSIS: MIXED VALUE. This document, essentially a trip report, received mixed reviews from those interviewed. The larger commercial shipyards that are into Japanese technology transfer saw it as "good, and needed". The other people interviewed (53%) saw it as useless. With 33% citing some kind of application of the information, however, even though indirectly or in related areas, a benefit value rating of mixed is appropriate.

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NSRP 0204

TITLE: THE EFFECT OF EDGE PAEPARATION ON COATING LIFE -PHASE II

AUTHOR: Franklin Research Center, for Avondale Shipyards, Inc.

DATE: February 1985 COST: (Not available)

ABSTRACT: This program evaluated the effect of edge preparation and application method on the life of three commonly used marine paint systems. The results are discussed and optimum radii are identified which result in edge protection approaching that of the flat surface. (39 p.)

BENEFIT ANALYSIS: LOW VALUE. This project, related to NSRP 0171, provides test results on how much bevel is needed on an edge before improved performance results are seen. 2/3 of those interviewed were either not interested, or had read the report and intended no application of the findings. One commentator stated that a magazine article was coming out as a result of this project, but no other evidence of usage was revealed during the interviews.

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NSRP 0205

TITLE : CATHODIC PROTECTION / P A R T I A L COATINGS VERSUS COMPLETE COATING  
IN BALLAST TANKS-A PROJECT UPDATE

AUTHOR : Associated Coating Consultants, for Avondale Shipyards, Inc.

DATE : February 1985 COST: \$35,700.

ABSTRACT: This report documents the results of three years ballast cycling of test tanks with the following protection systems: completely coated tanks with high performance coatings, partial coated tanks with cathodic protection, preconstruction primer with cathodic protection, and soft coatings with cathodic protection. The preconstruction primer with zinc anodes in performing shows promise of being an effective economical method of protection based on the testing to date. (30 p.)

BENEFIT ANALYSIS: MIXED VALUE. This is a progress report on a previous study. Although only 20% of those interviewed indicated any application of the findings, the nature of the research appears potentially valuable to laboratory people and specification preparers. 73% had either no interest in or use for

the results. This kind of investigation, however, appears unique to the industry, and therefore should be considered carefully before being abandoned.

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NSRP 0207

TITLE: DYNAMIC CORROSION TESTING "COPPERLOCK" SYSTEM

AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc.

DATE : April 1985 COST: \$10,000.

ABSTRACT: New coatings, such as "Copperlock" are being developed to prevent marine fouling. A study was completed to determine the rate at which Copperlock coating would corrode in seawater flowing at 30 fps and to determine the effect of Copperlock coating on the steel substrate exposed at faults in the coating both with and without Copperlock short circuited to the steel substrate. Test configuration and corrosion measurement techniques were discussed. Following a 63 day test period, it was concluded that Copperlock coating, as applied and tested, will not accelerate corrosion of the steel substrate provided there is no short circuit. At test conditions the coating corrosion/erosion rate is approximately two roils per year. No significant change in surface roughness appeared. (20 p.)

BENEFIT ANALYSIS: LOW VALUE. Although 87% of those interviewed found this project useless, the modest cost of this research must be considered before pronouncing sentence. Laboratory personnel indicated some usage of these results, which showed, quite surprisingly, that this process is effective over WOOD. Generally, however, a low benefit value must be assigned to this project.

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TITLE : ABRASIVE TESTING CABINETS -A STATE OF THE ART STUDY

AUTHOR: W.H. Radut Associates, for Avondale Shipyards.

DATE: June 1985 COST: \$5,400.

ABSTRACT: There is considerable work being done on developing specifications or guidelines for abrasives. SSPP, ASTM, NACE and others are involved in this work. Most of the physical testing and chemical testing is standardized either by ASTM methods or by using proprietary equipment. There are some performance characteristics, however, which are important to the evaluation of abrasive materials for which there are no standard tests. Examples are cutting rate, friability, and dust generation. Various investigators have constructed test chambers or test cabinets to conduct such tests. It was decided that an investigation was required into what existing equipment is available. As a result, a study was made to investigate the current state of the art. This document reports the results of that study. (60 p.)

BENEFIT ANALYSIS: LOW VALUE. This project received the lowest marks from those interviewed. Virtually everyone had either no interest in test cabinets or saw no application value in the results of the study. One said it was a "waste of time and money for SP-3" to sponsor this project. It appears, however, that some data from this study has been used by SSPC in developing a blast media specification, and also that the results have offered cabinets beyond the California design which was not available in sufficient numbers to fill the demand.

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NSRP 0218

TITLE : EVALUATION OF THE EFFCIVENESS BIAST CLEANING METHODS  
OF SURFACE PREPARATION

AUTHOR: Steel Structures Painting Council, for Avondale Shipyards, Inc.

DATE : June 1985 COST: \$33,800.

ABSTRACT : Dry abrasive blasting, the most efficient and economical technique for preparing steel for painting, is frequently not feasible or permittal for the following reasons: contamination of machinery or equipment, damage of adjacent intact paints, or visual dust pollution. The use of sand may present a hazard from silical dust inhalation. Currently, the most practical and widely used alternatives to dry blasting are wet methods of blast cleaning. The use of water in combination with abrasives significantly reduces the amount of dust produced and the range over which it is distributed. Wet methods of blast cleaning also reduce the visable pollution from abrasive dust clouds , This report describes the results of field evaluations of several different types and manufacturers of equipment for wet blasting. The objective of this study are to (1) determine cleaning rates and effectiveness of wet blast units, (2) determine safety, reliability, and practicability of wet blast units, and (3) develop guidelines for use of wet blast equipment for cleaning various types of structural steel for repainting. (88 p.)

BENEFIT ANALYSIS: LOW VALUE. 2/3 of those interviewed considerd this project either of no interest to them, or of no practical application value. Apparently this topic is an important one, but the equipment and procedures are not yet user-friendly. One commentor said "we want to stay current in this area". Another termed the report "educational", but of no practical use to him. Only one commentor was able to cite a specific application, and that was on a limited scale.

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NSRP 0227

TITLE: THE ECONOMICS OF SHIPYARD PAINTING, PHASE I (OF 3 PHASES)

AUTHOR : Peterson Builders, Inc. , for Avondale Shipyards, Inc.

DATE : January 1986 COST: \$75,000.

ABSTRACT: This report describes the first phase of a three year project; the objective for the first year was to deal with the problem of identifying the constituent parts of painting and surface preparation costs within the shipyard. The painting operation is somewhat unique in that the end product of the Paint Department is extremely susceptible to damage by other trades and resulting rework costs are generally high. Separate identity and tracking of the cost drivers in the painting area are essential to resolve the problems that are responsible for high painting costs. Phase I of this project has established a detailed labor reporting system for painting costs. (53 p.)

BENEFIT ANALYSIS: HIGH VALUE. This project received high marks from 60% of those interviewed, two of whom described the report as "easy to read and understand", and "containing extremely valuable information". One said that the report had spawned a rework study at his shipyard that would save much money. Another said that it surely would have been implemented at his shipyard but for the depressed nature of his workload whichh could not support it financially. While others (40%) found the information either of no interest or of no practical application value, the enthusiasm of those supporting this project outweighed the negative attitude decisively, hence the high value benefit rating. This project is known to be of especial value to the shipyard where it was developed, as important changes in operational procedures have taken place there as a direct result of these findings.

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NSRP 0228

TITLE: MARINE COATING PERFORMANCE -A SIX YEAR REPORT

AUTHOR: Associated Coating Consultants, for Avondale Shipyards, Inc.

DATE : October 1985 COST: \$79,500.

ABSTRACT: The objective of this project was to continue a series of exterior test performance studies which began in 1978 and 1980 as portions of other projects. For the first time, shipyards have access to data which can be used to evaluate the various generic coating systems presently on the market - to predict annual coating performance. In addition, accelerated test methods are presented which can be used to screen candidate coating systems. (38 p.)

BENEFIT ANALYSIS : HIGH VALUE. This on-going research effort has resulted in several articles in trade journals, including a 10-year report in the Journal of Protective Coatings and Linings (Dec 1988). A laboratory representative stated that the information generated by this project was "being used now in making recommendations for coatings usage". While 80% of those interviewed - principally shipyarders - saw this project as either of no interest or practical value to them, this kind of basic research is mandatory for downstream and long-term determinations of coatings usage by those who make such judgments. The key to enhancing beneficial returns from this type of investigation will be timely and effective communication of the findings to those who are in a position to make use of them.

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NSRP 0229

TITLE : PAINTING ON-BLOCK; THE ZONE PAINTING METHOD ADVANTAGE

AUTHOR : Avondale Shipyards, Inc.

DATE : March 1986 COST: (Not available)

ABSTRACT: This report describes the planning and methodology of zone-oriented painting based on the research of Japanese shipyards that have successfully implemented the Zone Painting Method (ZPM). A special focus in this report is given to the "on-block" painting stage in ZPM. Application of shop primer and on-board painting are also treated with some detail, as they are connected with on-block painting and are part of the zone-oriented painting process. (125 p.)

BENEFIT ANALYSIS: MIXED VALUE. This project joins two others (NSRP 0162 and 0194) as a trip report drawing mixed reviews. Those (33%) who are actively using the Japanese technology found that this information "fits". Those (40%) who are not involved with it found the information of no value or interest.

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NSRP 0246

TITLE: A SURVEY OF JAPANESE APPLIED MAFUNECWTING~

AUTHOR: Avondale Shipyards, Inc.

DARE : November 1985 COST: (Not available)

ABSTRACT: In July of 1982, an on-site inspection of Japanese shipbuilding facilities was Performed to study Japanese surface preparation and coatings planning and production methods. The study found that the Japanese have developed a standard coating system designed to facilitate construction, and that their approach to planning and construction does reduce cost. To test the hypothesis of the adequacy of the Japanese shipyard techniques, a research and development project was formulated to survey the performance of Japanese coated Ships (42 p.)

BENEFIT ANALYSIS: LOW VALUE. This project, which has resulted in at least one journal article, was considered "interesting", "an excellent report", but "difficult to relate/apply to U. S. shipyards". One rather lengthy comment seems to sum up the matter, and is offered here as another focus on this body of information. "We blast off shop primer. They (the Japanese) leave it on. We use 3 mil inorganic zinc and a topcoat. Our coatings perform better than their's. They choose a paint system to enhance productivity, not overall total performance. They sell (their ships) cheaper, even though the paint does not last as long (as ours). They do repairs at sea. We repair more extensively but at a higher cost by blasting off (the existing coating) and doing a good job. Their labor system is different than ours (which explains much of the difference in approach)." With no cited instance of application for the information produced by this project, a benefit rating of low value is assigned. However, staying current with this type of information would seem to be essential for the U. S. shipyard community, if for no other reason than to place our operations and philosophy in proper context with the global marketplace.

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NSRP 0248

TITLE : OVERCOATING OF INORGANIC ZINC PRIMERS FOR UNDERWATER SERVICE  
FINAL REPORT

AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc. , and  
National Steel and Shipbuilding Company

DATE: July 1986 COST: (Not available)

ABSTRACT: A major portion of coating costs may be attributed to surface preparation. This study investigated the acceptability of overcoating inorganic zinc primers in underwater service. Of particular interest was the performance of inorganic zinc pre-construction primers. If it can be demonstrated that conventional topcoats are compatible with inorganic zinc pre-construction primers in underwater service, the requirement for removing the primer by abrasive blasting prior to coating of the underwater hull might be eliminated resulting in a substantial cost savings. (36 p.)

BENEFIT ANALYSIS: MIXED VALUE. The message from this project, according to one commentator, is "if you are going to do it, test it first". While generating considerable interest among those interviewed, the project seems more targeted toward specification preparers than shipyards. Laboratory and Navy headquarters involvement would appear necessary before application of the findings, as specifications now generally prevent it. One commentator acknowledged that the report contained valuable information, but that "you need to read the whole report". The favorable enthusiasm of several interviewees for this information, however, lifts the benefit rating for this project to mixed value, even though no specific evidence of application was reported.

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NSRP 0272

TITLE : PROTOTYPE MINERAL ABRASIVE SHIPYARD OPERATION

AUTHOR : John W. Peart, Consultant for National Steel and Shipbuilding Co.

DATE : March 1987 COST: (Not available)

ABSTRACT: Reclamation of spent mineral abrasives is a new concept for shipyards. There is considerable value retained in spent abrasives, particularly with today's escalating procurement and disposal costs. The cost effective-

ness of reclaiming abrasives in some operations is further enhanced in the jurisdictions where the spent material is classified as hazardous waste. The reclaim potential of abrasives is discussed in this report, along with a quality comparison for reclaimed vs. virgin abrasive. The prototype reclaimer in operation at Bethlehem Steel Corporation is described and operational costs and payoff, as well as a review of design criteria, are discussed.  
(89 p.)

BENEFIT ANALYSIS: MIXED VALUE. This project is of particular interest to the larger shipyards using mineral abrasives of sufficient volume to support the effort. There was a suggestion from one commentor that the Navy may be interested in applying this technique to operations in the Naval Shipyard area. The currently low workloads in most of the commercial shipyards, however, precludes its application, hence the mixed benefit value rating assigned. It is interesting to note here that this concept has been found valuable for reclaimer efforts relating to work on highway bridges.

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NSRP 0275

TITLE: WORK PLANNING FOR SHIPYARD SURFACE PREPARATION AND COATING -  
A TRAINING MANUAL

AUTHOR: DDL OMNI Engineering Ltd.

DATE: January 1987 COST: \$75,000.

ABSTRACT: This report is the result of an industry survey and two workshops pertaining to work planning of surface preparation and coating activities within a shipyard environment. The purpose of the manual is to improve work planning by providing training material directed primarily at those personnel involved in the near-term planning, scheduling, and directing of SP&C operations. It provides: (1) the means to use the material for instructional purposes, and (2) work planning factors that will be of value to other levels of work planners within a shipyard. (498 p.)

BENEFIT ANALYSIS: HIGH VALUE. This project has not as yet produced any value for the shipyard industry. The Naval Shipyards have not been active in considering this information, and the commercial shipyards have not had sufficient workload to justify its use. Based on the response to the training provided by NSRP 0097, however, it appears that this project is on the right track and will provide valuable benefits to the industry.

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The following projects are on-going, and are identified by their project number (SPC panel sponsor - fiscal year - serial number).

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Project 3-84-1

TITLE: STANDARD CERTIFICATION AND TESTING OF WELD THROUGH PRIMERS

AUTHOR : Pennsylvania Shipbuilding (most recently)

DATE: Current COST: (Not available)

COMMENTARY: This project will try to get the paint/coating interests and the welding interests aligned on the rotter of weld through primers. No standards exist in this area at the moment, and the two sides appear at odds in most locations. However, those interviewed were generally anxious for this study, as the potential exists for this technique to make a valuable contribution to the capability of the industry.

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PROJECT 3-84-2

TITLE : EFFECTS OF CONTAMINANTS ON TANK COATING PERFORMANCE

AUTHOR : Dr. Gerald Soltz, GCS Corrosion Consultants

DATE: Nearly completed COST: \$73,100.

COMMENTARY: This project will produce basic research data that will "wind up as a specification eventually", according to one commentor. The general consensus gained from those interviewed was that although they foresaw little or no direct application in their own area, that this kind of project was needed to produce a data base of information for future consideration. This effort is essentially complete, with only publication of the final report remaining. It was felt that acceptance of the findings will depend in large measure on the effectiveness with which the findings are presented in the final report.

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PROJECT 3-84-3

TITLE: THE COST EFFECTIVENESS OF WIRE SPRAYED AWUNUM

AUTHOR: Puget Sound Naval Shipyard

DATE: Just beginning COST: \$75,000.

COMMENTARY: This project is just starting. The technique should provide an important Payback particularly in military applications. There was considerable interest in this project, with three commentors (other than the author) interested in doing the project themselves. This area scans to be a popular one, and worthy of investigation.

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PROJECT 3-84-4

TITLE : AUTOMATED PAINTING OF PIPE PIECES, HANGERS, AND OTHER SMALL PARTS:  
FEASIBILITY STUDY

AUTHOR: National Steel and Shipbuilding Company

DATE : Current COST: \$97,000.

COMMENTARY: The title of this project may be a bit misleading, as this study is concerned more with automated facilities for painting than with application of the coating itself. There is general interest in the subject, however, with several of those interviewed anxious to see the final report.

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PROJECT 3-85-1

TITLE: CALCTTE-TYPE COATINGS FOR CONTROLLING CORROSION IN SEGREGATED  
SEAWATER BALLAST TANKS

AUTHOR: James A. Ellor, Ocean City Research Corporation

DATE: Nearly completed COST: \$49,500.

COMMENTARY: This project explores a subject treated several times in the past 10 years. Most of those interviewed had little or no interest in it, except for the laboratory people. The final report on this project is currently being prepared.

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PROJECT 3-85-3

TITLE: ESTIMATING SURFACE PREPARATION AND COATINGS BIDS

AUTHOR: Peterson Builders, Inc.

DATE: current COST: \$78,500.

COMMENTARY: This project is Phase II of an earlier project (NSRP 0227) which was well received by the shipyard community. The general consensus among those interviewed was that this report would be interesting and useful. The project has been completed except for the final report, which should be published in the near future.

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## **MANAGEMENT OF SPC PANEL SP-3 ACTIVITIES**

### **- DETAILED DISCUSSION OF FINDINGS**

This section describes the opinion of those interviewed relative to the administration of SP-3 panel meetings, including such things as the use of pre-planned agenda, the actual format for a meeting, who should attend, how often a meeting should be held and under what circumstances (such as during the same time frame as the meeting of another Panel, or a Symposium, where possible), what matters should/should not be discussed, how meeting minutes should be handled, and similar considerations that bear on the mechanics of the panel meeting itself. It also describes the thoughts of those interviewed on how the NSRP can be of more assistance to them, what projects should be prosecuted, and in general what message they would like to have transmitted back to Panel SP-3.

The discussions that produced these opinions were most gratifying, as without exception each person interviewed was open, serious, and anxious to make known his/her position on the matter at hand. These individuals are the core of Panel SP-3 as we know it today, and so their feelings are surely important to the progressive and favorable future of the Panel.

The responses are summarized under the headings of each question, following the order and language of the worksheet, Appendix B, used during the interviews.

#### **HOW OFTEN DO YOU ATTEND?**

60% attend regularly. 25% attend once a year. The rest were regular attendees, but now are unable to attend due to financial constraints. One of the latter category stated that the cost for attendance at a distant location was about \$2,000. per person (airfare, overnight, focal, etc.). He would be able to attend only local meetings, and those were few and far between. It was also mentioned that attendance may depend on having an active project to report on at the meeting; without such an impetus, attendance would be "difficult". In the present austere atmosphere, projects are not plentiful, which suggests that there may be a growing problem with attendance in the future.

(Note: A table showing attendance at Panel meetings over the past several years begins on page 45).

#### **DO/SHOULD OTHERS IN YOUR ORGANIZATION ATTEND?**

17% answered this question with a NO, and felt that others need not attend. However, the vast majority felt otherwise. Suggested for attendees were the following:

Paint Superintendent	Paint Foreman
Blast Superintendent	Blast Foreman
Safety people	Environmental people
Contracts people	Energy representative
Outfitting Superintendent	Vice President of Operations
Quality Assurance people	Paint Shop Head
Production Manager (once a year)	Planning and Estimating people
Their boss, and his boss.	

An interesting feature of this lineup of potential attendees is the emphasis on shipyard management and hands-on people, a theme that will carry through several of the responses to other questions below.

#### **ARE THE MEETINGS OF VALUE TO You?**

92% said YES. only one commentor noted otherwise, and he felt that the meetings were too restricted to what is on the agenda. All of those interviewed valued the personal contacts with their peers, and, as one put it, the meeting is "an excellent forum for the SP&C area". Several noted the value of the "social" periods aside from the formal meeting itself, such as lunch and dinner, where important contacts and associations can be made and nurtured into lasting relationships.

#### **HOW CAN THE MEETINGS BE IMPROVED?**

##### **- INCREASE/DECREASE THE NUMBER OF MEEING DAYS?**

The present pattern is for a meeting of 1-1/2 days duration, which was favored by 60% of those interviewed. There were 3 votes for 2-days, and 1 vote each for 1-day and 3-days. On the frequency of meetings, the present pattern is for 3 meetings a year at varying locations. Most felt that this was good, with only 1 vote for more frequent and 1 vote for less frequent. Several felt that more frequent meetings might make a nearby meeting location more likely for some, but might force a further drop in attendance for others. It appears, then, that the present practice of holding a 1-1/2 day meeting 3 time a year at varying locations should be continued.

**- CONTINUE/CHANGE MEETING FORMAT?**

75% felt that the present format (under Jim Ruecker, NASSCO) is "excellent" and should be continued. Comments for improvement were:

1 - Address environmental issues regularly,

2 - Arrange more special presentations on important topics.

3 - Avoid letting administrative rotters dominate the meeting.

4 - Avoid lengthy presentations on items of narrow interest.

**- CONTINUE/CHANGE CONTENT OF MEETING?**

Here the message from the commentors was twofold: (1) let up on project reporting, unless it is absolutely necessary or requested by the panel because of some real concern with the project or its performance; and (2) apply more focus on practical applications and the ability of the shipyards to produce. Otherwise, the present content should be continued.

**- BROADEN/RESTRICT WHO CAN ATTEND?**

The dominant point expressed on this question was that SHIPYARD people are needed at the meetings, especially those from the Naval Shipyards. There should be more Foremen, hands-on people, "doers", which will help to preserve the shipbuilder focus that the Panel needs. One commentor, in promoting the shipyarder focus, expressed concern for long absences of any one shipyard participant, which might weaken the "team" idea. He also felt that the input and knowledge of vendors was necessary and valuable, but that their sometimes aggressive salesmanship coupled with their apparent financial freedom to attend regularly might produce an undesirable bias or even disruption to Panel discussions and activities. A similar concern was expressed in regard to academics and research people, whose input might jeopardize or dilute the shipyard focus. There was a call for abrasive suppliers and small tool specialists, along with "experts from other industries" who might share their knowledge or practical experiences on matters of mutual interest. Overall, however, the desire was for increasing the participation of shipyard "application people" to help preserve the Panel focus on shipyard matters.

-WHAT SHOULD BE ADDED TO THE AGENDA?

The items suggested for addition to the agenda were as follows:

1 - Coatings requirements for fresh water service.

2 - VOC/EPA matters, regularly for the foreseeable future,  
such as a continuing update on the California coatings rule.

3 - More details on the application of existing technology.

4 - Progress of the entire shipbuilding industry (not just SP&C)  
which might come from reports by selected industry representatives.

5 - A problem-solving period, where questions and answers can be  
discussed freely from the floor.

If a question cannot be answered at that meeting, it can be  
readdressed at the next meeting.

If it cannot be answered then, it can be made into a project  
for investigation and resolution.

6 - Information on small tools availability.

-WHAT SHOULD BE DROPPED FROM THE AGENDA?

There were two distinct items in this category. One is the long tortuous presentation on any matter that commands a narrow band of interest. The other is "groping for project status reports". Otherwise, those interviewed were quite satisfied that the present agenda content needs little "culling".

-SHOULD MEETINGS BE HELD IN CONJUNCTION WITH OTHER ORGANIZATIONS?

The message here was "occasionally, but not to interfere with tours or other extras". It appears from the comments received, however, that any doubling up must consider the compatibility of the two activities, and not just their existence during the same time frame. That is, there may be little incentive to attend both just because they are there, but rather a need for interest or involvement in both to prompt double attendance. Further, even partial attendance at one should not preclude full attendance at the other, so that there is no forced dilution of participation in either. Also, the general opinion was that once a year is often enough for a joint or double meeting. There was considerable interest, however, in trying joint or double Panel meetings, particularly where one may be able to assist the other. A case in

point might be the use of Panel SP-8 to assist in the practical application of technology developed by SP-3.

- A R E M E E I N G O F V A L U E T O Y o u ?

2/3 of those interviewed found the present minutes (taken, prepared and issued by Jim Ruecker, NASSCO) as entirely satisfactory. The use of a tape recorder (by Ruecker) to capture information was seen as effective, and not inhibiting to the attendees. There were three votes for less detail ("a smaller package is more attractive"), one request for an executive summary of the minutes, and one vote for more timely issuance. Otherwise, the sentiment expressed for the present practice was clearly complimentary.

HOW CAN THE NSRP BE OF MORE ASSISTANCE TO YOUR SHIPYARD?

The following comments were gathered in response to this question:

1 - We have regressed due to the economic situation. Operating in the survival mode does not support exchanging information with competitors. We need to keep the avenues of communication open and active. The NSRP can help here.

2 - Panel reports and products should be made usable as is, and not require us to translate and rewrite them before sending them along to shipyard shop and application people.

3 - We need more information on activities and projects of other Panels. A periodic newsletter would be good.

4 - We should have more joint Panel meetings, and they should be frequent.

5 - We should get all Panels together, and help each other with developments and application. A round-robin arrangement might be effective.

6 - We should have fewer managers. We need to cross-pollinate our (existing) managers and then rotate them. The NSRP should address this idea.

7 - We need more emphasis on the application of our knowledge. We suffer in putting our ideas and capabilities into effect. We need to MAKE it work.

8 - We need a generic compilation of the facilities and equipment necessary in a shipyard, particularly in regard to the EPA aspects of the work. It should be in a condensed format, and should include an update of the current laws and requirements in plain english.

9 - We need the senior members of the NSRP to make regular and frequent personal contacts with the senior members of the shipyard community to strongly encourage their participative support of the NSRP. They need to "get with it". We are seriously lacking senior level concern and support.

WHAT PROJECTS WOULD YOU LIKE TO SEE CARRED OUT?

The "shopping list" of projects accrued during the interviews is as follows:

1 - We need to study where the paint (SP&C) industry is going. For example, will open-air blasting be allowed in 5 years? We need to predict our future needs NOW, or else we will not be able to acquire (the equipment and facilities) in time to satisfy our needs, and will be faced with a serious impact

2 - The incorporation of corrosion control into MIL specs and contract drawings.

3 - Development of WC paints, and measurement of their performance. VOC paints are (currently) expensive (material cost) because of proprietary development cost recovery.

4 - SP-3 should work closely with SP-8 for application of ideas and techniques.

5 - Multi-layering of coatings, such as anti-fouling to epoxy. We need better and more flexible coatings. We cannot do epoxy except 5 months of the year (a northern shipyard).

6 - The effect of grit contamination on coatings.

7 - Grit recycling - this one did begin, but needs to be carried out.

9 - How to feather-in flame spray. This project might be voluntary, that is, no government funding. We might have contributions from participants and get our money that way.

9 - Rudder coatings are a problem on (Navy) surface ships. Would like information on what commercial shipyards have done on their own in this area.

10 - We need coatings for cargo holds. The material carried in tanks and holds is causing corrosion problems.

11 - The use of acids and pretreatments of aluminum. This will be the future way to go.

DO YOU HAVE ON-(GOING SP&C PROJECTS?)

This question was intended to explore the general atmosphere surrounding the performance of projects, rather than to assemble a list of existing projects (which we already know about). The point came up several times, and that was the unavailability of resources for committal to doing a project at the present time because of the depressed nature of the industry and the corresponding lack of senior level support for extra activities. As one commentor put it "the marketplace does not support volunteering right now". In this regard, another commentor suggested that although a project might be too much for one shipyard to handle right now, the effort might be shared by two or more shipyards, spreading out the work and getting more people involved in it. This question also evoked information on two on-going areas of effort that might be of some interest to SP-3:

1 - A grit recovery investigation, where grit is reclaimed and examined on return. This project currently involves several grit companies along with the sponsoring shipyard.

2 - Recent research on touchup, which may be of potential value to all shipyards, including the Naval Shipyards.

WHAT WOULD YOU LIKE TO SEE INVESTIGATED (PROBLEM AREAS)?

Another "shopping list" question, the following areas were suggested for future consideration:

1 - Environmental controls (humidity) for painting, particularly for water-based paints being promoted by the Navy,

2 - closed-cycle exterior blast system. Different companies are working on it. We need to draw this area to a conclusion, as it will save much money for exterior hull blasting.

3 - Water-based paints for underwater hulls.

4 - Application of plastic blast media (ala Hill AFB efforts).

5 - Training. Training. Training. The training course for supervisors never reached a conclusion. We also need a 2-day course with a manual on what needs to be done to establish a paint program at a facility.

6 - The quality of our proposals needs to improve, as it may reflect the ultimate outcome of the project itself. We need to upgrade the quality of the effort all around.

7 - There has been little planning for SP&C efforts. We are "tail-end Charlie". We need attention to planning and scheduling matters so that we can better control the SP&C processes.

8 - Top management needs to become aware of our (sp&c) needs. Reading the Executive Summary of reports is not enough.

9 - We need better information of which (NSRP) reports have been distributed to whom, and when. The distribution profile has been lumpy in the past .

10 - Customers are asking for exotic coatings and features, which are less compatible with OSH/EPA requirements. Simpler requirements from customers would allow the shipbuilder to more often meet OSH/EPA requirements.

11 - Water-based paints cannot be used at 15 degrees F. We need coatings that will last for a reasonable time, like 3 years, and not ruin the environment.

12 - We need to study blast/paint air quality requirements for water and oil contamination.

13 - We need a suitable alternative to the "monkey face" blast hood.

14-Facility needs are promoted by production, who needs to understand what the future holds. These needs push up from the bottom. **The process is** frustrated by the inability of production people to understand and evaluate the complicated legal language of environmental requirements. **There is a** communications Problem here. This includes hazardous waste generation, handling, storage, and disposal.

WHAT MESSAGE WOULD YOU LIKE TRANSMITTED TO PANEL SP-3?

Here was an opportunity for those interviewed to express their thoughts on any matter they wished. All of their comments are presented below, as nearly verbatim as could be captured.

1 - SP-3 has been beneficial over the years. Attendees all learn something, and not necessarily the same thing. It is useful. Keep it going. It is a link between shipyards, suppliers, etc. Nobody is isolated.

2 - Hope for a viable shipbuilding program in the USA so we can utilize the information and the capability we have in hand.

3 - Keep going.

4 - We need Navy involvement in Panel activities. The right person should be here, not the bottom of the ladder. Also, (the Chairman) organizes the Panel and keeps it on course, but the people run the Panel, and will discuss what they want to discuss.

5 - Keep charging. Look for ways to revitalize the U.S. industrial base. We need better trades, bartering, swapping businesses, employees. It will open up eventually.

6 - My concerted opinion after several years of involvement is that SP-3 should continue. The SP&C area would suffer without SP-3 input, focus, project prosecution, etc. Every industry has a focus and a forum. For SP&C this is SP-3.

7 - We have plenty of theory. Let's go do application. Let's produce.

8 - We need more agreement from the Navy to do a project, and agreement to follow the results when they are beneficial.

9 - Sales people should understand that SP-3 is not a sales meeting. It is a place for technical representatives and information exchange, not salesmanship. We know they sell, and we will call them anyway. They do not need to "court" us.

10 - Naval Shipyards should sponsor meetings.

11 - Information exchange at meetings is valuable and should be continued.

12 - A Panel meeting may become "loaded" in the production direction, or technical direction, or paint supplier direction, or academic direction, etc. This is dangerous if it is the day of the great vote on which projects will be on top of the priority list. We need a stable, shipbuilder-oriented group to do the prioritizing, not a catch-as-catch-can effort at the Panel meeting.

13 - Senior management needs to understand what it is costing not to be participating. The NSRP needs a kingpin who will take a strong, aggressive posture.

14 - We should plot attendance (at SP-3 meetings) to see who is present and supporting, especially in the absence of an on-going project.

In response to item 14 above, available information on attendees has been plotted below (pages 45 and 46).

The following have attended three or more of the SP-3 Panel Meetings held during the past 5 years:

Meeting Date:											
	FEB 1989	OCT 1988	MAY 1988	FEB 1988	NOV 1987	JUN 1987	FEB 1987	OCT 1986	JUL 1986	OCT 1985	FEB 1984
Arinc Research	X							X	X		
Bath Iron Works	F	F	S	S	S			S	S	S	S
Bechtel National, Inc.	Z	Z		Z	Z		Z	Z	Z		
Bethlehem steel Corp. , sparrows Point	X	X	X	X	X	X					
Chesapeake Specialty Products	X	X	X	X			X				
David Taylor Research Center - Annapolis	X	X		X			X		X		
Desco Manufacturing coo	X	X		X			X				
Devoe coatings	X	X		X			X				
Exxon co., International	X	X		X	X	X	X	X	X	X	
Federal Highway Administration	P	P	P	P			P	P			
GCS Corrosion Consultants	X	X	X	X					X		
General Dynamics, Electric Boat Div.	X	X	X	X	X	X					
Ingalls Shipbuilding Div.	X		X		X		X	X	X		X
Inorganic Coating	S	S	X	X							
International Paint, Inc.	X	X		X			X	X	X		
KTA-TATUR, Inc.	X	X						X			
L. Birnbaum, Inc.			X				X			X	
Maritime Administration			X	X	X	X	X	X	X		X
National Steel and Shipbuilding Corp.	X	X	X	X	X	X	X	X	X		
Navsea o5	X	X	X		X	X	X	X			
Navsea o7	X	X	X		X		X				Z
Newport News Shipbftilding	X	X		X							
NSY Philadelphia	X	X	X	X	X	X	X	X	X		
NSY Puget Sound	X	X	X		X	X	X	X			
Ocean City Research Carp	X	X		X			X	X			
Pennsylvania Shipbuilding Corp.	X	X	X		X	X	X	X			
Peterson Builders, Inc.	X	X	X		X	X	X	X			
Pro-Line Paints	X	X	X		X	X	X				
Reed Minerals	X	X		X			X	X			
R-P-M and Assoc. ,Inc	X	X	X		X	X	X	X			
Steel Structures Painting Council	X	X	X		X	X	X				
S. G. Pinney& Assoc., Inc			X	X			X				
Todd Pacific, L.A. Div.							F	X	F	F	F
Valspar co.	X	X	X	X				X	X	X	
W. H. Radut Assoc					X			X	X	X	

Key: F = Oren Funkhouser

P = John Peart

S = Mike Sfirri

Z = Ben Fultz

The following have attended - or less of the SP-3 Panel Meetings held during the past 5 years:

Meeting Date:	1989	1988	1988	1988	1987	1987	1987	1986	1986	1985	1984
	Feb	Oct	May	Feb	Nov	Jun	Feb	OCT	Jul	OCT	Feb
Amega Engineering -----					X						
Ameron Marine Coatings -----		X									
Am. Hot-Dip Galvanizers Assoc. -----					X						
Atlantic Drydock Carp-----	X										
Avondale Shipyards, Inc. -----								X	P		
Bay Area Air Quality Control-----			X								
Bay Shipbuilding Carp -----		X		X							
Continental Marine -----		X									
Continental Maritime of S.F. -----		X									
Contracts Consultants and Assoc. -----		X									
D P & L -----				X							
David Taylor Research Center - Bethesda -								X	X		
DDL Omni-----								X	X		
DOK - BLOK, Inc.-----			X								
Dow corning-----	X	X									
Florida Institute of Technology					X						
FMC corp-----										X	
Hempel's Marine-----										X	
Institute of Applied Technology										X	
Institute of Gas Technology - - -	X										
J. G. S.-----		X	X								
Kleen Blast -----			X								
Lee Engineering -----			X								
M & T Chemical Inc.-----			X								
Marine Services Agency, Inc. - - -					X			X			
Marinette Marine Corp. -----						X					
Metallic Ceramic Coatings, Inc. -									X		
Miami Marine Research - - -										X	
Nautical Coatings, Inc. -----			X								
NavSses-----	X										
NorShipCo-----							X				
NSY Mare Island -----	X				X						
NSY Norfolk -----	X										
NSY Portsmouth -----		X		X							
Occidental Chemical - - -				X							
Rocky Mountain Energy Co. - - -								X			
SF AQMD -----	X										
Shipbuilding Consultants, Inc. - - -										X	
Sigma Coatings -----			X	X							
Smith, Bucklin & Assoc-----				X							
Smith Eastern Corps -----	X	X									
Stan-Blast Abrasives - - -										X	
U.S. Department of Labor - OSHA - - -			X	X							
William O'Sullivan & Assoc. - - -			X	X							

## CONCLUSIONS FROM THE FINDINGS

### -THOSE ASSOCIATED WITH PROJECTS

The projects yielding the most benefit value are seen in two general categories:

1. - Those projects with practical application potential; e.g. , training, tools handbook, planning handbook, SP&C cost-driver determinations.

2. - Those projects providing basic data, not available elsewhere, and needed to support the generation or revision of specifications and standards; e.g., data on coating performance.

The projects yielding the least benefit value are those of narrow interest in the SP&C community, and those with no (or little) application potential; e.g., copper-nickel hull sheathing, calcite coatings for corrosion control.

### - THOSE ASSOCIATED WITH PANEL MEETING ADMINISTRATION

The present administration of Panel meetings (under Jim Ruecker, NASSCO) is quite satisfactory. Several points are pertinent:

1. - Meetings of 1-1/2 days duration, three times a year, at varying locations, are favored (present practice).

2. - A meeting in conjunction with another SPC Panel, technical group (e.g. , ASTM F-25) , or technical symposium would be desirable, but only about once a year.

3\* - The present format, minutes, and meeting content (variety) should be continual.

4. - There is a need to increase the number of shipyard people who attend meetings and participate in Panel matters.

5. - Overall the Panel needs to maintain a shipyard focus on projects, discussions, and activities.

6. - There are several subjects that need to be discussed at Panel meetings, and several areas of concern or interest that may support the generation of projects in the near future (see pages 38 through 44).

## RECOMMENDATIONS FROM THE CONCLUSIONS

### - THOSE PERTAINING TO PANEL PROJECTS

The members of Panel SP-3 who generate, vote on, or otherwise influence the projects to be sponsored by the Panel, should carefully consider what potential benefits a project may logically be expected to yield. A project with the greatest likelihood of satisfying a practical application need in the shipyard community should receive the highest consideration. A project that will provide basic data needed to support the generation or modification of specifications or standards, which data is not available elsewhere, should also receive the highest consideration.

A project with limited or no shipyard application potential, or designed to explore an area of narrow SP&C interest, should be weighed carefully before being supported, especially if other projects of higher potential value to the shipyard community are available for consideration.

### - THOSE PERTAINING TO PANEL MEETING ADMINISTRATION

The present practices for Panel meetings should be continued, with only minor changes.

Efforts should be made to attract more shipyard people to attend meetings and participate in Panel activities.

The Panel members should carefully preserve and promote a shipyard focus on Panel matters.

Several suggestions for projects and for discussion at Panel meetings, should receive prompt consideration (see pages 38 through 44).

### - GENERAL

Senior Government Administrators of the NSRP, the Chairman of the Ship production Committee, and all members of the Executive Control Board should aggressively encourage the participation of senior shipyard managers in NSRP activities and in application of research results.

APPENDIX A

Project Benefit Analysis

Questionnaire / SP-3 Projects Listing

PROJECT BENEFIT ANALYSIS  
for SNAME SPC Panel SP-3

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QUESTIONNAIRE

Date \_\_\_\_\_

Shipyard Coded Ident \_\_\_\_\_

Note: Shipyard identity will not be revealed in the published report.

General Information

Shipyard Name and Location \_\_\_\_\_

Main Person Contacted \_\_\_\_\_

Position/Title \_\_\_\_\_

Address \_\_\_\_\_ Phone Number ( ) \_\_\_\_\_

Shipyard Size (#) \_\_\_\_\_ Production Workers (#) \_\_\_\_\_

Ship Types \_\_\_\_\_

New Construction (Y/N) \_\_\_\_\_ Repair (Y/N) \_\_\_\_\_ Union (Y/N) \_\_\_\_\_

Current Workload Size \_\_\_\_\_

Other Persons Contacted \_\_\_\_\_

SP-3 PROJECTS LISTING

	<b>KEY</b>	<b>REMARKS</b>
1-A Improved Fabrication primer for Protection of Steel 1973 NSRP 0032		
2-A Prefailure Evaluation Techniques for Coating Systems 1974 NSRP 0033		
3-A Automated Painting of Structural Steel Shapes 1974 NSRP 0034		
4-A Developmmt of Non-Polluting Solvent-Free Liquid Resin Coating Systems for Ships 1975 NSRP 0045		
3-B Catalog of Existing Small Tools 5-A for Surface Preparation and Support Equipment for Blasters and Painters 1977 NSRP 0064 (Note: Being redone)		
6-A Practical Shipbuilding Standards 7-A for Surface Preparation and Coatings 1979 NSRP 0091 Task 3-76-3		
2-B Marine Coating Performance for Different Ship Areas 1979 NSRP 0092 Task 3-76-4		
3-C Training Courses for Blasters 5-B and Painters 1979 NSRP 0097 Task 3-77-1 (See also 3-H)		
3-H Training Course for Blasters 5-G and Painters (Revision to 1979 Project) 1984 NSRP 0097 Task 3-83-2 (See also 3-C)		

3-L Work Planning for Shipyard  
5-J Surface Preparation and  
Coating Training  
1987 NSRP 0275 Task 3-81-1

5-C Cleaning of Steel Assemblies  
and Shipboard Touch-Up Using  
Citric Acid  
1980 NSRP 0105 Task 3-77-2

3-D Shipyard Marking Methods  
5-D 1980 NSRP 0114 Task 3-76-2

4-B Copper-Nickel Hull Sheathing  
study  
1980 NSRP 0119

2-C Determination of Volume Solids  
3-E of Paints and Coatings by  
Accurate Dry Film Thickness  
Measurements  
1981 NSRP 0127

4-C The Feasibility of Calcite  
Deposition in Ballast Tanks  
as a Method of Corrosion  
Control  
1981 NSRP 0129  
(Note: This was Phase II -  
Phase III will not be done)

6-B Procedural Handbook Surface  
7-B Preparation and Coating of  
Tanks and Closed Areas  
1981 NSRP 0130 Task 3-75-1

2-D Evaluation of Near Solventless  
Coatings for Marine Use  
1981 NSRP 0132 Task 3-77-4

2-E Evaluation of Water Borne  
Coatings for Marine Use  
1981 NSRP 0134 Task 3-77-3

5-E Survey of Existing and  
Promising New Methods of  
Surface Preparation  
1982 NSRP 0155

8-A Surface Texture (Profile)  
Measurement  
1982 NSRP 0156

2-F Cathodic Protection/Partial Coatings Versus Complete Coatings in Tanks  
1982 NSRP 0158 Task 3-77-6

3-F A Descriptive Overview of  
5-F Japanese Shipbuilding Surface Preparation and Coating Methods  
1982 NSRP 0162

8-B The Effects of Edge Preparation Standard Phase I and II  
1983 NSRP 0171 Task 3-81-3

8-C Surface Preparation:  
A Comparative Analysis of Existing Standards;  
A Proposed Marine Standard  
1983 NSRP 0176

3-G Zone Painting Method  
1983 NSRP 0177 Task 3-81-2

3-I An Investigation of Possible Ways to Enhance Tite Deposition of Calcite-Type coatings  
1984 NSRP 0187 Task 3-82-1

8-D Mineral Slag Abrasive Survey and Specification  
1984 NSRP 0188 Task 3-79-3

1-B Evaluation of Rust Compatible Primers for Marine Application  
1984 NSRP 0191

3-J Shipyard Design and Planning for a Zone Oriented Painting system  
1984 NSRP 0194 Task 3-81-2

2-G The Effect of Edge Preparation on Coating Life - Phase II  
1985 NSRP 0204

2-H Cathodic Protection/Partial Coating Versus Complete Coating in Ballast Tanks - A Project Update  
1985 NSRP 0205 Task 3-SP-2

2-I Dynamic Corrosion Testing  
"Copperlock" Coating System  
1985 NSRP 0207 Task 3-SP-5

5-H Abrasive Testing Cabinets -  
A State of the Art Study  
1985 NSRP 0217 Task 3-SP-6

8-E Evaluation of the Effectiveness  
of Wet Blast Cleaning Methods  
of Surface Preparation  
1985 NSRP 0218 Task 3-SP-4

3-N The Economics of Shipyard  
Painting  
NSRP 0227

2-J Marine Coating Performance -  
A Six Year Report  
1985 NSRP 0228

3-K Painting On-Block; The Zone  
Painting Method Advantage  
1986 NSRP 0229

2-K A Survey of Japanese Shipyard  
Applied Marine Coatings  
Performance  
1985 NSRP 0246

2-L Overcoating of Inorganic Zinc  
Primers for Underwater Service  
1986 NSRP 0248 Task 3-82-2

5-I Prototype Mineral Abrasive  
Reclaimer; Shipyard Operation  
NSRP 0272

4-D Waterborne Coatings for Marine  
Coatings  
(Note: Dropped) Task 3-S2-3

1-C Standard Certification and  
Testing of Weld Through Primers  
Task 3-84-1  
(Note: On-going project -  
Penn Ship)

8-F Effects of Contaminants on  
Tank Coating Performance  
Task 3-84-2  
(Note: Jerry Soltz 'blisters')

4-E The Cost Effectiveness of  
Wire Sprayed Aluminum  
Task 3-84-3  
(Note: Contracting in progress -  
Puget Sound NSY - Start 1989)

3-M Automated Painting of Pipe  
Pieces, Hangers and Other  
Small Parts: Feasibility Study  
Task 3-84-4

4-F Calcite-Type Coatings for  
Controlling Corrosion in  
Segregated Seawater Ballast  
Tanks  
Task 3-85-1  
(Note: Report being prepared -  
Jim Ellor)

3-O Estimating SP&C Bids  
5-K Task 3-85-3  
(Note: Phase II will finish  
soon - PBI)

2-M Degree of Coating Cure Effect  
on Performance  
Task 3-85-4  
(Note: Dropped - Not funded)

- 1 - PRIMER - IMPROVED
- 2 - COATING - EVALUATION
- 3 - PAINTING - METHOD IMPROVEMENT
- 4 - COATING - IMPROVED
- 5 - SURFACE PREPARATION - METHOD IMPROVEMENT
- 6 - PAINTING - STANDARD
- 7 - SURFACE PREPARATION - STANDARD
- 8 - SURFACE PREPARATION - EVALUATION

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Key	<b>Rating</b>	Description
0		No interest / knowledge
1		Interested; will gather information
2		Have information; considering it
3		Have studied information; no application intended
4		Information looks useful; application planned
5		Applied once; no further application seen
6		Have applied on limited scale; may apply again
7		Have applied substantially; technique useful.
8		Constant application on-going; technique valuable
9		Need more information; wider application

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POSSIBLE RATING SYSTEM FOR STUDY PARTICULARS

APPINDIX B

Questionnaire / Worksheet

SP-3 Panel Meetings

## QUESTIONNAIRE

### PANEL MEETINGS

How Often Do You Attend \_\_\_\_\_  
\_\_\_\_\_

Do/Should Others In Your Organization Attend \_\_\_\_\_  
\_\_\_\_\_

Are The Meetings Of Value To You (Specify) \_\_\_\_\_  
\_\_\_\_\_

How Can The Meetings Be Improved \_\_\_\_\_  
\_\_\_\_\_

Increase/Decrease Number Of Meeting Days \_\_\_\_\_  
\_\_\_\_\_

Continue/Change Meeting Format \_\_\_\_\_  
\_\_\_\_\_

Continue/Change Content Of Meeting \_\_\_\_\_  
\_\_\_\_\_

Broaden/Restrict Who Can Attend \_\_\_\_\_  
\_\_\_\_\_

What Should Be Added To The Agenda \_\_\_\_\_  
\_\_\_\_\_

What Should Be Dropped From The Agenda \_\_\_\_\_  
\_\_\_\_\_

Should Meeting Be Held In Conjunction With Other Organizations \_\_\_\_\_  
\_\_\_\_\_

Are Meeting Minutes Of Value To You (Specify) \_\_\_\_\_  
\_\_\_\_\_

How Can The NSRP Be Of More Assistance To Your Shipyard \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What Projects Would You Like To See Carried Out \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Do You Have** Ongoing SP&C Projects (Identify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What Would You Like To See Investigated (Specify Problem Areas) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What Message Would You Like Transmitted To Panel SP-3 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## APPENDIX C

SP-3 Projects Listing

based on

Benefits Gained

## APPENDIX C

### SP-3 Projects Listing based on Benefits Gained

This is an abbreviated listing of SP-3 Projects, based on the benefit value (number of '\*'s) assigned to each project, highest to lowest. This listing is included as an aid to understanding which types of projects were found to be of most (and least) interest and value to the using community, based on the user comments received during this survey.

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NSRP 0097 \*\*\*\*\*

TITLE : TRAINING COURSES FOR BLASTERS AND PAINTERS AND STUDENT HANDBOOK  
(2 VOLs)  
AUTHOR: Institute of Applied Technology, for Avondale Shipyards, Inc.  
DATE : 1979; Revised 1984 COST: \$60,000.

NSRP 0227 \*\*\*\*\*

TITLE : THE ECONOMICS OF SHIPYARD PAINTING, PHASE I (OF 3 PHASES)  
AUTHOR : Peterson Builders, Inc., for Avondale Shipyards, Inc.  
DATE : January 1986 COST: \$75,000.

\*\*\*\*\*

NSRP 0064 \*\*\*\*\*

TITLE : CATALOG OF EXISTING SMALL TOOLS FOR SURFACE PREPARATION AND  
SUPPORT FOR BLASTERS AND PAINTERS  
AUTHOR : Avondale Shipyards, Inc.  
DATE : May 1977 COST: (Not available)

NSRP 0091 \*\*\*\*\*

TITLE : PRACTICAL SHIPBUILDING STANDARDS FOR SURFACE PREPARATION  
AND COATINGS  
AUTHOR: Offshore Power Systems, for Avondale Shipyards, Inc.  
DATE : 1979 COST: (Not available)

NSRP 0130 \*\*\*\*\*

TITLE : PROCEDURAL HANDBOOK.  
SURFACE PREPARATION AND COATING FOR TANKS AND CLOSED AREAS  
AUTHOR : Complete Abrasive Blasting Systems, Inc. , for Avondale  
Shipyards, Inc.  
DATE : September 1981 COST: \$24,000.

NSRP 0228 \*\*\*\*\*

TITLE : MARINE COATING PERFORMANCE - A SIX YEAR REPORT  
AUTHOR : Associated Coating Consultants, for Avondale Shipyards, Inc.  
DATE : October 1985 COST: \$79,500.

\*\*\*\*\*

NSRP 0092 \*\*\*\*\*

TITLE: MARINE COATING PERFORMANCE FOR DIFFERENT SHIP AREAS (VOLS I & II)  
AUTHOR: Offshore Power Systems, for Avondale Shipyards, Inc.  
DATE : 1979 COST: (Not available)

NSRP 0156 \*\*\*\*\*

TITLE: SURFACE TEXTURE (PROFILE) MEASUREMENT  
AUTHOR: Offshore Power Systems/Westinghouse, for Avondale Shipyards, Inc.  
DATE : by 1982 COST: (Not available)

NSRP 0275 \*\*\*\*\*

TITLE: WORK PLANNING FOR SHIPYARD SURFACE PREPARATION AND COATING-  
A TRAINING MANUAL  
AUTHOR: DDL OMNI Engineering Ltd.  
DATE : January 1987 COST: \$75,000.

\*\*\*\*\*

NSRP 0188 \*\*\*\*\*

TITLE : MINERAL SLAG ABRASIVE SURVEY AND SPECIFICATION  
AUTHOR : Ocean City Research Corporation, for Avondale Shipyards, Inc.  
DATE : April 1984 COST: (Not available)

NSRP 0272 \*\*\*\*\*

TITLE : PROTOTYPE MINERAL ABRASIVE RECLAIMER: SHIPYARD OPERATION  
AUTHOR: John W. Peart, Consultant for National Steel and Shipbuilding Co.  
DATE : March 1987 COST: (Not available)

\*\*\*\*\*

NSRP 0045 \*\*\*\*\*

TITLE : DEVELOPMENT OF NON-POLLUTING SOLVENT-FREE LIQUID RESIN  
COATING SYSTEMS FOR SHIPS  
AUTHOR : Battelle-Columbus Laboratories, for General Dynamics/Quincy  
DATE : 1975 COST: (Not available)

NSRP 0105 \*\*\*\*\*

TITLE : CLEANING OF STEEL ASSEMBLIES AND SHIPBOARD TOUCH-UP USING  
CITRIC ACID  
AUTHOR : Offshore Power Systems, for Avondale Shipyards, Inc.  
DATE : May 1980 COST: (Not available)

NSRP 0155 \*\*\*\*\*

TITLE : SURVEY OF EXISTING AND PROMISING NEW METHODS OF SURFACE  
PREPARATION  
AUTHOR : Steel Structures Painting Council, for Avondale Shipyards, Inc.  
DATE : April 1982 COST: (Not available)

NSRP 0176 \*\*\*\*\*

TITLE: SURFACE PREPARATION: A COMPARATIVE ANALYSIS OF EXISTING STANDARDS  
AND A PROPOSED MARINE STANDARD  
AUTHOR: Institute of Applied Technology, for Avondale Shipyards, Inc.  
DATE : August 1983 COST: (. Not available)

NSRP 0191 \*\*\*\*\*

TITLE: EVALUATION OF RUST COMPATIBLE PRIMERS FOR MARINE APPLICATIONS  
AUTHOR: Rensselaer Polytechnic Institute, for Avondale Shipyards.  
DATE: May 1984 COST: (Not available)

NSRP 0205 \*\*\*\*\*

TITLE : CATHODIC PROTECTION/PARTIAL COATINGS VERSUS COMPLETE COATING  
IN BALIAST TANKS - A PROJECT UPDATE  
AUTHOR: Associated Coating Consultants, for Avondale Shipyards, Inc.  
DATE : February 1985 COST: \$35,700.

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NSRP 0032 \*\*\*\*

TITLE : IMPROVED FABRICATION PRIMER FOR PROTECTION OF STEEL  
AUTHOR : General Dynamics/Quincy  
DATE: 1973 COST: (Not available)

NSRP 0177 \*\*\*\*

TITLE : ZONE PAINTING METHOD  
AUTHOR: IHI, for Avondale Shipyards, Inc.  
DATE: August 1983 COST: \$100,000.

NSRP 0194 \*\*\*\*

TITLE : SHIPYARD DESIGN AND PLANNING FOR A ZONE ORIENTED PAINTING SYSTEM  
AUTHOR: IHI Marine Technology, for Avondale Shipyards, Inc.  
DATE : July 1984 COST: \$100,000.

NSRP 0229 \*\*\*\*

TITLE : PAINTING ON-BLOCK; THE ZONE PAINTING METHOD ADVANTAGE  
AUTHOR : Avondale Shipyards, Inc.  
DATE : March 1986 COST: (Not available)

NSRP 0248 \*\*\*\*

TITLE : OVERCOATING OF INORGANIC ZINC PRIMERS FOR UNDERWATER SERVICE -  
FINAL REPORT  
AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc., and  
National Steel and Shipbuilding Company  
DATE : July 1986 COST: (Not available)

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NSRP 0114 \*\*\*

TITLE : SHIPYARD MARKING METHODS  
AUTHOR : Bethlehem Steel Corp (Sparrows Point) for Avondale Shipyards, Inc.  
DATE : September 1980 COST: (Not available)

NSRP 0158 \*\*\*

TITLE : CATHODIC PROTECTION/PARTIAL COATINGS VERSUS COMPLETE COATINGS  
IN TANKS  
AUTHOR : Offshore Power Systems, for Avondale Shipyards, Inc.  
DATE : May 1982 COST: \$50,000.

NSRP 0171 \*\*\*

TITLE : THE EFFECTS OF EDGE PREPARATION STANDARD PHASE I  
AUTHOR : Dr. Leslie W. Sandior, for Avondale Shipyards, Inc.  
DATE : May 1983 COST: \$50,000.

NSRP 0217 \*\*\*

TITLE : ABRASIVE TESTING CABINETS - A STATE OF THE STUDY  
AUTHOR : W.H. Radut Associates, for Avondale Shipyards.  
DATE : June 1985 COST: \$5,400.

NSRP 0246 \*\*\*

TITLE : A SURVEY OF JAPANESE APPLIED MARINE COATING PERFORMANCE  
AUTHOR : Avondale Shipyards, Inc.  
DATE : November 1985 COST: (Not available)

\*\*\*\*\*

NSRP 0033 \*\*

TITLE : PREFAILEURE EVALUATION TECHNIQUES FOR COATING SYSTEMS  
AUTHOR : Battelle-Columbus Laboratories, for General Dynamics/Quincy  
DATE : 1974 COST: (Not available)

NSRP 0034 \*\*

TITLE : AUTOMATIIC PAINTING OF STRUCTURAL STEEL SHAPES  
AUTHOR: General Dynamics/Quincy  
DATE : 1974 COST: (Not available)

NSRP 0127 \*\*

TITLE : DETERMINATION OF VOLUME SOLIDS OF PAINTS AND COATINGS BY  
ACCURATE DRY FILM THICKNESS MESUREMENTS  
AUTHOR : Georgia Institute of Technology, for Avondale Shipyards, Inc.  
DATE : March 1981 COST: (Not available)

NSRP 0129 \*\*

TITLE : THE FEASIBILITY OF CALCITE DEPOSITION IN BALLAST TANKS AS A  
METHOD OF CORROSION CONTROL  
AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc.  
DATE : August 1981 COST: (Not available)

NSRP 0134 \*\*

TITLE : EVALUATION OF WATER BORNE COATINGS FOR MARINE USE  
AUTHOR : Georgia Institute of Technology, for Avondale Shipyards. Inc.  
DATE : November 1981 COST: \$33,700.

NSRP 0162 \*\*

TITLE : A DESCRIPTIVE OVERVIEW OF JAPANESE SHIPBUILDING SURFACE  
PREPARATION AND COATING METHODS  
AUTHOR : Avondale Shipyards, Inc.  
DATE: September 1982 COST: (Not available)

NSRP 0204 \*\*

TITLE : THE EFFECT OF EDGE PREPARATION ON COATING LIFE -PHASE II  
AUTHOR : Franklin Research Center, for Avondale Shipyards, Inc.  
DATE: February 1985 COST: (Not available)

NSRP 0207 \*\*

TITLE : DYNAMIC CORROSION TESTING "COPPERLOCK" COATING SYSTEM  
AUTHOR: Ocean City Research Corporation, for Avondale Shipyards, Inc.  
DATE : April 1985 COST: \$10,000.

NSRP 0218 \*\*

TITLE : EVALUATION OF THE EFFECTIVENESS OF WEX BLAST CLEANING METHODS  
OF SURFACE PREPARATION  
AUTHOR: Steel Structures Painting Council, for Avondale Shipyards, Inc.  
DATE : June 1985 COST: \$33,800.

\*\*\*\*\*

NSRP 0119 \*

TITLE: COPPER-NICKELHULL SHEATHING STUDY  
AUTHOR: Dr. Leslie W. Sandor, for Sun Ship, Inc.  
DATE : December 1980 COST: (Not available)

NSRP 0132 \*

TITLE : EVALUATION OF NEAR SOLVENTLESS COATINGS FOR MARINE USE  
AUTHOR : Springborn Laboratories, Inc., for Avondale Shipyards, Inc.  
DATE: October 1981 COST: \$27,500.

NSRP 0187 \*

TITLE : AN INVESTIGATION OF POSSIBLE WAYS TO ENHANCE TITLE DEPOSITION OF  
CALTITE-TYPE COATINGS  
AUTHOR : Ocean City Research Corporation, for Avondale Shipyards, Inc.  
DATE : January 1984 COST: \$55,000.

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